FISH CONSUMPTION ADVISORIES IN THE ASHTABULA RIVER ASSESSMENT AREA

Final Report

Prepared for:

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1.1 Introduction – Authority and Legal Requirements

The 137 square-mile Ashtabula River watershed lies principally in the extreme northeast of Ohio and empties into Lake Erie's central basin at the City of Ashtabula. Decades of manufacturing activity and waste management practices at industrial facilities resulted in the discharge or release of a variety of hazardous substances to Fields Brook, a tributary to the Ashtabula River, and subsequently to the Ashtabula River. Hazardous substances released into the lower Ashtabula River watershed include, but are not limited to, polychlorinated biphenyls (PCBs), polyaromatic hydrocarbons (PAHs), hexachlorobenzene, pentachlorobenzene, and heavy metals such as cadmium, mercury, lead and zinc (U.S. Department of the Interior and Ohio Environmental Protection Agency 2001).

The U. S. Fish and Wildlife Service (Service) of the U.S. Department of the Interior (DOI), the Ohio Environmental Protection Agency (Ohio EPA), and the National Oceanic and Atmospheric Administration (NOAA) of the U.S. Department of Commerce (DOC) are conducting a natural resource damage assessment (NRDA) of the Ashtabula River and Harbor as defined under the Comprehensive Environmental Response, Compensation and Liability Act, 42 U.S.C. § 9601, *et.seq.* (CERCLA, more commonly known as the federal "Superfund" law) and the Federal Water Pollution Control Act, 33 U.S.C. § 1251, *et seq.* Clean Water Act (CWA).

Each of the above Agencies is a designated natural resources trustee under Section 107(f) of CERCLA, 42 U.S.C. § 9607(f), Section 311 of the CWA, 33 U.S.C. § 1321, and other applicable law, including Subpart G of the National Contingency Plan (NCP), 40 C.F.R. §§ 300.600-300.615. As a trustee, each Agency is authorized to act on behalf of the public to assess natural resource injuries and recover damages for losses of natural resource services attributed to releases of hazardous substances. The Secretary of the Interior acts as trustee for natural resources managed or controlled by the DOI, including their supporting ecosystems (40 C.F.R. 300.600(b), (b)(2), and (b)(3)). In accordance with 42 U.S.C. § 9607(f)(2)(B), the Director of the Ohio EPA has been designated the natural resource trustee by the Governor of Ohio pursuant to Executive Order 2000-20T, dated June 26, 2000. The Secretary of Commerce acts as trustee for natural resources managed or controlled by the DOC and for natural resources managed or controlled by other federal agencies that are found in, under, or using waters navigable by deep draft vessels, tidally influenced waters, and their supporting ecosystems (NCP, 40 C.F.R § 300.600(b)(1)).

The DOI regulations for conducting NRDAs are found in 43 C.F.R. Part 11. As defined in the NRDA regulations, injury means a measurable adverse change, either long- or short-term, in the chemical or physical quality or the viability of a natural resource resulting either directly or indirectly from exposure to a discharge of oil or release of a hazardous substance, or exposure to a product of reactions resulting from the discharge of oil or release of a hazardous substance. The DOI regulations define a number of specific injuries to natural resources. These specific injury definitions include two that are related to the effects of chemical concentration on human use and consumption of fish or wildlife. According to

these definitions, "injury to a biological resource has resulted from the ...release of a hazardous substance if concentration of the substance is sufficient to..."

- exceed levels for which an appropriate State health agency has issued directives to limit or ban consumption of such organism [43 C.F.R. § 11.62 (f)(1)(iii)]
- exceed action or tolerance levels established under section 402 of the Food, Drug and Cosmetic Act, 21 U.S.C. 342, in edible portions of organisms [43 C.F.R. § 11.62 (f)(1)(ii)]

1.2 Purpose

This report describes the history and the basis for the fish consumption advisories in the Ashtabula River and Harbor resulting from the accumulation of polychlorinated biphenyls (PCBs) and other hazardous substances in fish tissue. The purpose of this report is to: 1) document the issuance of fish consumption advisories by the Ohio Department of Health or other authorized agencies, and 2) document exceedence of U.S. Food and Drug Administration (FDA) tolerances and/or action limits. This report does not present data and/or information related to the releases of PCBs, transport/exposure pathways, or biological/toxicological effects; that information is being addressed in other NRDA reports.

2.1 Fish Consumption Advisories for Ohio

Fish consumption advisories have been issued for various waters in Ohio since the early 1980s. Data are collected and analyzed, and advice issued through a cooperative program among Ohio Department of Health (ODH), Ohio EPA, and Ohio Department of Natural Resources (ODNR). The fish tissue monitoring program was managed by ODH until 2002, at which time the program was assigned to the Ohio EPA, Division of Surface Water (DSW) (Ohio Environmental Protection Agency 2003). Fish tissue concentrations change slowly in response to changes in sediment and water column concentration. Therefore, sampling does not occur every year, but is conducted on a revolving schedule, or after a significant change in the watershed, such as the remediation of contaminated sediments at the Fields Brook Superfund Site (Dr. John Estenik, Ohio EPA, personal communication).

From 1983 though 1993 ODH issued advisories based on comparisons of fish tissue data with U. S. Food and Drug Administration tolerances and action levels for PCBs and other hazardous substances. In 1994 Ohio adopted the "Protocol for a Uniform Great Lakes Sport Fish Consumption Advisory" (Great Lakes Sport Fish Advisory Task Force 1993) for fish consumption advisories resulting from PCB contamination. ODH also has, and continues to issue advisories based on State derived trigger concentrations and "best

professional judgment", when multiple hazardous substances are present below trigger values for individual hazardous substances.

Great Lakes Sport Fish Advisory Task Force Protocol

The "Protocol for a Uniform Great Lakes Sport Fish Consumption Advisory", or Great Lakes Protocol (Great Lakes Sport Fish Advisory Task Force 1993) was adopted by the State of Ohio in 1994 and has been used as the method for developing sport fish consumption advisories due to PCB contamination since it's adoption. The Great Lakes Protocol establishes five categories into which fish are placed based on PCB concentrations:

1) Unrestricted
2) One meal/week
3) One meal/month
4) 6 meals/year
5) No Consumption

The Protocol uses a Health Protection Value (HPV) of 0.050 ug (microgram) PCBs/kg body weight/day. This corresponds to a daily intake of 3.5 ug/g PCBs per day for a 70 Kg (154 lb) human. A 50 percent reduction in PCB concentration (due to trimming and cooking) and a meal size of 227 g (1/2 lb) is assumed. Species and sizes of fish are assigned to one of the five advisory categories based on their PCB concentration as described in Table 1 (Great Lakes Sport Fish Advisory Task Force 1993).

Table 1: Fish Advisory Categories and corresponding ranges of PCB concentration in fish.

Consumption Advise	Unrestricted	1 meal/week	1 meal/month	6 meals/year	Do not eat
PCB (ug/g)	<0.050	0.05 to 0.2	0.2 to 1.0	1.0 to 2.0	>2.0

2.2 Ashtabula River Fish Consumption Advisories

Fish Consumption Advisory from 1983-1997

In 1983, the Ohio Department of Health and the Ohio Environmental Protection Agency issued a fish advisory recommending that no one consume fish (all species) caught in a two mile length of the Ashtabula River from the mouth, including the harbor within the breakwaters, to the 24th Street bridge. Specifically, the notice stated that "recent analyses of fish caught in that area revealed high levels of PCBs, hexachlorobenzene, pentachlorobenzene, and tetrachloroethane". The advisory remained in effect from 1983 until 1997 and was advertised in the form of press releases, fishing regulations and signs

posted along the Ashtabula River (Figure 1). Because fish have unrestricted access, and move freely between Fields Brook and the Ashtabula River, data from both Fields Brook and the Ashtabula River have historically been used in establishing fish consumption advisories for the Ashtabula River. (Regan Williams, Ohio EPA, per. com.).

Figure 1. Fish Advisory Sign Located on the Ashtabula River. This Sign was in place in June 2005.

2.2.2 Fish Consumption Advisory Revision 1998

In 1998, a revised fish consumption advisory was issued, recommending the following maximum consumption rates:

-Smallmouth bass - limit to one meal a week due to PCB contamination;
-Largemouth bass and walleye - limit to one meal a month due to PCB and mercury contamination;
-Channel catfish and common carp - limit one meal every two months due to PCB contamination.

This revision was based on a comprehensive evaluation of available contaminant data, including assessing the potential human health impacts from the continuing presence of various hazardous substances in sport fish species available for consumption. Consumption advice resulting from PCB contamination followed the procedures in the Great Lakes Protocol. The advice based on mercury contamination was derived using the U.S. Environmental Protection Agency's Integrated Risk Information System's (IRIS) reference dose of 0.0001 mg/kg/day and maximum daily ingestion of 7 ug/day.

2.2.3 Fish Consumption Advisory Revision 2004

The Ashtabula River fish consumption advisory was revised in 2004. The revision included an extension of the advisory upriver to U.S. Route 20 from the original 24th Street bridge location. An additional advisory was issued from Hilldom Road to U.S. Route 20 recommending that consumption of largemouth bass be limited to one meal per month because of mercury contamination. The 2004 advisory recommended the following maximum consumption rates from U.S. Route 20 to the mouth of the Ashtabula River:

-Channel catfish and common carp - limit to one meal every two months due to PCB contamination;
-Brown and yellow bullhead - limit to one meal per month due to PCB contamination;
-Largemouth bass and walleye - limit to one meal per month due to mercury and PCB contamination.

Smallmouth bass were removed from the 2004 Ashtabula River advisory because of a statewide 'one meal per week' mercury advisory for all fish from all Ohio waters. However, the single smallmouth bass sample collected from the Ashtabula River (in 2002) contained 0.17 ug/g PCBs. At this concentration, a "one meal per week" advisory would have been issued due to PCB contamination if the State wide mercury advisory was not already in effect. As in 1998, consumption advice based on PCBs followed the Great Lakes Protocol. Advice based on mercury contamination followed the same procedure used in 1998.

2.2.4 Summary of Fish Consumption Advisories for the Ashtabula River, 1983 through 2004

Table 2 summarizes the fish consumption advisories for the Ashtabula River from 1983-2002. All of the advisories were issued by an authorized state agency, and were based on the commonly accepted scientific principles at the time they were issued.

Table 2: Summary of Fish Consumption Advisories for Ashtabula River (1983-2004)

Year(s)	Species	Contaminant(s)	Advice	Location
1983 – 1997	All	PCBs, Hexachlorobenzene, Pentachlorobenzene, Tetrachloroethane	Do Not Eat	24th St. Bridge to Lake Erie
1998 - 2003	Smallmouth Bass	PCBs	One Meal a Week	24th St. Bridge to Lake Erie
	Largemouth Bass, Walleye	Mercury, PCBs	One Meal a Month	24th St. Bridge to Lake Erie
	Channel Catfish, Common Carp	PCBs	One Meal Every 2 Months	24th St. Bridge to Lake Erie
2004	Largemouth Bass	Mercury	One Meal a Month	Hilldom Rd to U.S. Rt. 20
	Channel Catfish, Common Carp	PCBs	One Meal Every 2 Months	U.S. Rt. 20 to Lake Erie
	Brown Bullhead, Yellow bullhead	PCBs	One Meal a Month	U.S. Rt. 20 to Lake Erie
	Largemouth Bass, Walleye	Mercury, PCBs	One Meal a Month	U.S. Rt. 20 to Lake Erie

2.3 U.S. Food and Drug Administration Action and Tolerance Levels

The Federal Food, Drug, and Cosmetic Act (FFDCA) (21 U.S.C. 301 *et seq.*) authorizes the FDA to protect the public health by regulating food shipped via interstate commerce. Sections 402 and 406 of the Act prohibit food from entering interstate commerce, if the food contains any added poisonous or deleterious substance that is unsafe, unless the presence of the poisonous or deleterious substances cannot be avoided. A primary purpose of Section 406 is to authorize the FDA to regulate levels of environmental contaminants that enter food. Under this section, the FDA may limit the quantities of such substances by using formal rulemaking to set legal limits called tolerances. The tolerances are set at the level necessary to protect the public health, taking into account the extent to which the substance is unavoidable and the ways that a consumer may be affected by deleterious substances (44 FR 38330).

Fishery resources are injured if they contain concentrations of a hazardous substance sufficient to exceed action levels or tolerances established by the FDA [43 CFR § 11.62 (f)(1)(ii)]. The FDA established a tolerance of 5 ug/g for total PCBs in fish and shellfish in 1973. New toxicity data for PCBs, as well as an evaluation of levels of PCB contamination in food, led the FDA to propose reducing the tolerance level for PCBs from 5 ug/g to 2 ug/g in fish and shellfish (42 FR 17487). In 1984, the reduced PCB tolerance level of 2 ug/g took effect [21 CFR 109.30 (a)(7)].

2.3.1 Exceedence of the U.S. FDA PCB tolerance in the Ashtabula River

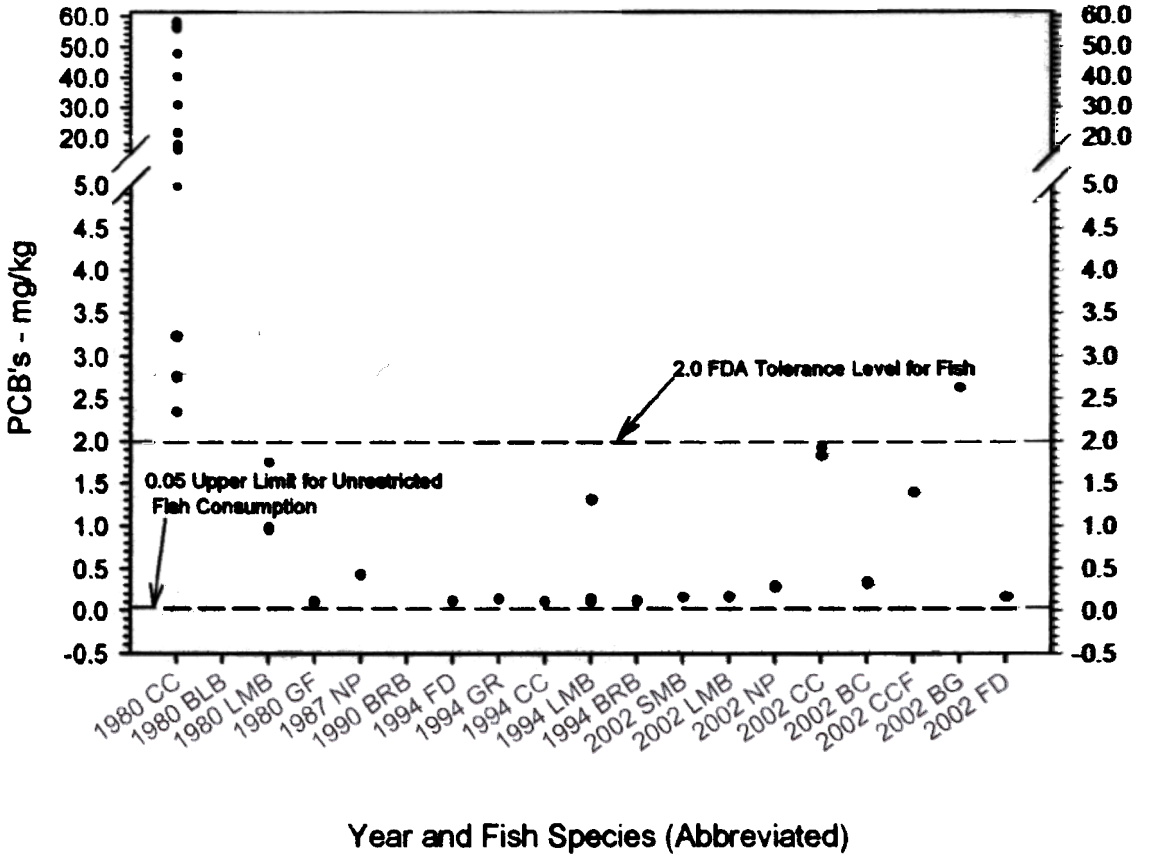
Fish tissue PCB data from the Ashtabula River and Fields Brook (Appendix 1) demonstrate that, in 1980, both common carp and goldfish exceeded the 5 ppm (ug/g) PCB tolerance that was in effect from 1973 to 1984. The data in Appendix 1, further demonstrate that the 2 ppm (ug/g) PCB tolerance that took effect in 1984 was exceeded by common carp in 1994 and bluegill sunfish in 2002.

3.1 Summary of Injury Determination and Findings

Data presented in this report demonstrate that multiple species of fish have been injured because of: (1) PCB levels for which Ohio has issued directives to limit or ban consumption [43 CFR 11.62(f)(1)(iii)]; and (2) Exceedences of tolerances for PCBs established by the FDA under the Food, Drug and Cosmetic Act [43 CFR 11.62(f)(1)(ii)]

Figure 1 Contains the PCB data for edible portions of fish that the Ohio Department of Health and Ohio Environmental Protection Agency have used to develop fish consumption advisories for the Ashtabula River since 1983. A large number of fish were analyzed in 1980, primarily in and near Fields Brook. Between 1987 and 2002 fewer fish were analyzed and they were collected from throughout the lower Ashtabula river (see Appendix 1). As illustrated in Figure 1, all samples collected between 1980 and 2002 exceed the upper limit for unrestricted consumption specified in the Protocol (Great Lakes Sport Fish Advisory Task Force 1993) and many exceed the U. S. Food and Drug Administration PCB tolerance of 2.0 ug/g.

Figure 1. PCB concentrations in edible portions of fish from the Ashtabula River and Fields Brook.



CC = common carp, BLB = black bullhead, LMB = largemouth bass, GF = goldfish, NP = northern pike, BRB = brown bullhead, FD = freshwater drum, GR = golden redhorse, SMB = smallmouth bass, BC = black crappie, CCF = channel catfish, BG = bluegill

Data represent both single fish and composite samples, see Appendix 1 for details.

3.1.1 Injury Determination - Fish Consumption Advisories

Fishery resources have been injured if they contain concentrations of a hazardous substance sufficient to exceed levels for which an appropriate state health agency has issued directives to limit or ban consumption of such organisms [43 CFR § 11.62 (f)(1)(iii)]. The State of Ohio has issued fish consumption advisories for the Ashtabula River from 1983 through the present. Ohio advised against consumption of all species of fish because of contamination with PCBs, hexachlorobenzene, pentachlorobenze and tetrachloroethane from 1983 to 1997. From 1998 to 2003 Ohio advised only limited consumption of smallmouth bass, largemouth bass, walleye, channel catfish, and common carp because of PCBs and mercury contamination. From 2004 through the present, Ohio advises only limited consumption of largemouth bass, channel catfish, common carp, brown bullhead, yellow bullhead and walleye because of PCB and mercury contamination. Therefore, injuries pursuant to this definition exist for the Ashtabula River Assessment Area from 1983 through the present day.

3.1.2 Injury Determination – Exceedence of FDA Tolerance for PCBs

Fishery resources have been injured if they contain concentrations of a hazardous substance sufficient to exceed action or tolerance levels established under section 402 of the Food, Drug and Cosmetic Act, 21 U.S.C. 342, in edible portions of organisms [43 C.F.R. § 11.62 (f)(1)(ii)]. Fish tissue residue data collected by the Ohio Environmental Protection Agency demonstrate exceedance of the applicable PCB tolerances by common carp and goldfish in 1980, common carp in 1994 and bluegill sunfish in 2002. Therefore, injuries pursuant to this definition exist for the Ashtabula River Assessment Area in 1980, 1994 and 2003.

References:

U. S. Department of the Interior and Ohio Environmental Protection Agency. 2001 Preassessment Screen for the Ashtabula River and Harbor. U.S. Fish and Wildlife Service, Fort Snelling, MN 55111.

Great Lakes Sport Fish Advisory Task Force. 1993. Protocol for a Uniform Great Lakes Sport Fish Consumption Advisory. Council of Great La

Ohio Environmental Protection Agency. 2003. Final Draft Ohio's Fish Tissue Monitoring Program; Ohio's Sport Fish Tissue Consumption Advisory Program. November.

Appendix 1: Ashtabula River and Fields Brook Total PCB fish concentration data. Each data point represents a single analysis

(All non-detected values were calculated at one half detection value)

Year	Location	Fish Sampled	Type	PCB (ug/g)
1980	Fields Brook – Ashtabula area	COMMON CARP	SFF	6.11685
1980	Fields Brook – Ashtabula area	COMMON CARP	SFF	17.14885
1980	Fields Brook – Ashtabula area	BLACK BULLHEAD	SFF	4.26685
1980	Fields Brook – Ashtabula area	LARGEMOUTH BASS	SFF	0.9903
1980	Fields Brook – Ashtabula area	GOLDFISH	SOF	3.5253
1980	Fields Brook – Ashtabula area	GOLDFISH	SOF	9.86675
1980	Fields Brook – Ashtabula area	LARGEMOUTH BASS	SFF	1.7581
1980	Fields Brook – Ashtabula area	GOLDFISH	SOF	5.64485
1980	Fields Brook – Ashtabula area	GOLDFISH	SOF	0.12075
1980	Fields Brook – Ashtabula area	LARGEMOUTH BASS	SOF	0.951
1980	Fields Brook – Ashtabula area	COMMON CARP	SOF	5
1980	Fields Brook – Ashtabula area	COMMON CARP	SOF	2.348
1980	Fields Brook – Ashtabula area	COMMON CARP	SOF	7.735
1980	Fields Brook – Ashtabula area	COMMON CARP	SOF	4.0965
1980	Fields Brook – Ashtabula area	COMMON CARP	SOF	14.7956
1980	Fields Brook – Ashtabula area	COMMON CARP	SOF	2.762
1980	Fields Brook – Ashtabula area	COMMON CARP	SOF	17.7333
1980	Fields Brook – Ashtabula area	COMMON CARP	SOF	40.16485
1980	Fields Brook – Ashtabula area	COMMON CARP	SOF	47.6554
1980	Fields Brook – Ashtabula area	COMMON CARP	SOF	30.8954
1980	Fields Brook – Ashtabula area	COMMON CARP	SOF	56.07
1980	Fields Brook – Ashtabula area	COMMON CARP	SOF	58.12
1980	Fields Brook – Ashtabula area	COMMON CARP	SOF	3.227
1980	Fields Brook – Ashtabula area	COMMON CARP	SOF	8.153
1980	Fields Brook – Ashtabula area	COMMON CARP	SOF	12.1221
1980	Fields Brook – Ashtabula area	COMMON CARP	SOF	16.35
1980	Fields Brook – Ashtabula area	COMMON CARP	SOF	21.8913
1980	Fields Brook – Ashtabula area	COMMON CARP	SOF	12.1826
1980	Fields Brook – Ashtabula area	COMMON CARP	SOF	13.7665
1987	Ashtabula R. dst. Fields Brook	NORTHERN PIKE	SOF	0.426
1990	Ashtabula R. (USGS sample)	BROWN BULLHEAD	SFF	0.66
1994	Ashtabula R. at Ashtabula – upst. 24th St.	FRESHWATER DRUM	SOFC	0.124
1994	Ashtabula R. at Ashtabula – upst. 24th St.	GOLDEN REDHORSE	SOFC	0.147
1994	Ashtabula R. at Ashtabula – upst. 5th St., dst. RR bridge	COMMON CARP	SFFC	0.122
1994	Ashtabula R. at Ashtabula – upst. 5th St., dst. RR bridge	LARGEMOUTH BASS	SOFC	0.121
1994	Ashtabula R. at mouth	BROWN BULLHEAD	SFF	0.123
1994	Ashtabula R. at Ashtabula – upst. 24th St.	LARGEMOUTH BASS	SOF	0.149
1994	Ashtabula R. at mouth	LARGEMOUTH BASS	SOFC	0.566
1994	Fields Brook at Ashtabula – at mouth	LARGEMOUTH BASS	SOF	1.31074
1994	Fields Brook at Ashtabula – at mouth	COMMON CARP	SFFC	3.7375
2002	Ashtabula R. at Ashtabula upst. U.S. Rt. 20	SMALLMOUTH BASS	SOF	0.1743

2002	Ashtabula R. at Hilldom Rd.	LARGEMOUTH BASS	SOF	0.17255
2002	Ashtabula R. at Hilldom Rd.	LARGEMOUTH BASS	SOF	0.175
2002	Ashtabula R. at Kelloggsville – State Rd.	LARGEMOUTH BASS	SOF	0.17395
2002	Ashtabula R. dst. Ashtabula Rec. Center	NORTHERN PIKE	SOF	0.2948
2002	Ashtabula R. near mouth at Lake Erie	COMMON CARP	SOF	1.9255
2002	Ashtabula R. near mouth at Lake Erie	BLACK CRAPPIE	SOF	0.3317
2002	Ashtabula R. near mouth at Lake Erie	COMMON CARP	SOF	1.8315
2002	Ashtabula R. upst. Ash Rec Center	CHANNEL CATFISH	SFF	1.3995
2002	Fields Brook at Ashtabula at mouth	BLUEGILL SUNFISH	SOFC	2.62875
2002	Fields Brook at Ashtabula at mouth	FRESHWATER DRUM	SOF	0.1722

SFF = Skin on fillet
SOF = Skin off fillet
SFFC = Skin on fillet composite of 3 to 5 fish
SOFC = Skin off fillet composite of 3 to 5 fish